

REMARKS

Upon entry of the above amendment, claims 1-6, 10-14, 18 and 22-32 will be pending in this application.

The amendments to the claims do not introduce new matter within the meaning of 35 U.S.C. §132. Accordingly, the Examiner is respectfully requested to enter the above amendment before examination.

If the Examiner has any questions regarding this submission, she is invited to telephone the undersigned attorney.

Respectfully submitted,
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Appendix A

Claim Amendments

1. (Currently amended) ~~Process~~ A process for preparing an optically pure proton pump inhibitor (PPI) having a sulfinyl ~~sulphinyl~~ structure in enantiomerically pure or enantiomerically enriched form comprising oxidizing a ~~by oxidation of the~~ corresponding sulfide of said PPI, wherein ~~sulphides, characterized in that~~ the oxidation is carried out in the presence of a chiral zirconium complex or a chiral hafnium complex.

2. (Currently amended) ~~Process~~ A process for preparing an optically pure PPI having a sulfinyl ~~sulphinyl~~ structure in enantiomerically pure or enantiomerically enriched form comprising oxidizing a ~~by oxidation of the~~ corresponding sulfide of said proton pump inhibitor (PPI), wherein ~~sulphides, characterized in that~~ the oxidation is carried out in the presence of a chiral zirconium complex.

3. (Currently amended) ~~Process~~ The process according to Claim 1, ~~characterized in that~~ wherein the optically pure

PPI having a sulfinyl ~~sulphinyl~~ structure is obtained in an optical purity of > 90%.

4. (Currently amended) ~~Process~~ The process according to Claim 1, ~~characterized in that~~ wherein the oxidation is carried out using cumene hydroperoxide.

5. (Currently amended) ~~Process~~ The process according to Claim 1, ~~characterized in that~~ wherein the chiral zirconium complex is selected from the group consisting of zirconium(IV) acetylacetonate, zirconium(IV) butoxide, zirconium(IV) tert-butoxide, zirconium(IV) ethoxide, zirconium(IV) n-propoxide, zirconium(IV) isopropoxide and [[or]] zirconium(IV) isopropoxide/isopropanol, ~~complex or~~ and wherein the chiral hafnium complex is selected from the group consisting of hafnium(IV) acetylacetonate, hafnium(IV) butoxide, hafnium(IV) tert-butoxide, hafnium(IV) ethoxide, hafnium(IV) n-propoxide, hafnium(IV) isopropoxide and [[or]] hafnium(IV) isopropoxide/isopropanol ~~complex is used.~~

6. (Currently amended) ~~Process~~ The process according to Claim 2, ~~characterized in that~~ wherein the chiral zirconium

complex is selected from the group consisting of
zirconium(IV) acetylacetonate, zirconium(IV) butoxide,
zirconium(IV) tert-butoxide, zirconium(IV) ethoxide,
zirconium(IV) n-propoxide, zirconium(IV) isopropoxide and
[[or]] zirconium(IV) isopropoxide/isopropanol ~~complex is~~
~~used.~~

7.- 9. (Canceled)

10. (Currently amended) ~~Process~~ The process according to
Claim 1, ~~characterized in that~~ wherein the oxidation is
carried out in the presence of an organic base.

11. (Currently amended) ~~Process~~ The process according to
Claim 1, ~~characterized in that~~ wherein the oxidation is
carried out in the presence of a tertiary amine.

12. (Currently amended) ~~Process~~ The process according to
Claim 1, ~~characterized in that~~ wherein the oxidation is
carried out in an organic solvents solvent.

13. (Currently amended) ~~Process~~ The process according to
Claim 1, ~~characterized in that~~ wherein the oxidation is

carried out in an organic ~~solvents~~ solvent comprising 0 to 0.3% by volume of water.

14. (Currently amended) ~~Process~~ The process according to Claim 1, ~~characterized in that~~ wherein the oxidation is carried out in an organic solvent which ~~essentially~~ comprises methyl isobutyl ketone.

15-17. (Canceled)

18. (Currently amended) ~~Process~~ The process according to Claim 1, ~~characterized in that~~ wherein the optically pure PPI prepared by the process is selected from the group consisting of (S)-5-methoxy-2-[(4-methoxy-3,5-dimethyl-2-pyridinyl)methylsulphanyl]-1H-benzimidazole, (S)-5-difluoromethoxy-2-[(3,4-dimethoxy-2-pyridinyl)methylsulphanyl]-1H-benzimidazole, (S)-2-[3-methyl-4-(2,2,2-trifluoroethoxy)-2-pyridinyl)methylsulphanyl]-1H-benzimidazole, (S)-2-{[4-[3-methoxypropoxy)-3-methylpyridin-2-yl)methylsulphanyl]-1H-benzimidazole, (S)-5-methoxy-2-[(4-methoxy-3,5-dimethyl-2-pyridylmethyl)sulphanyl]-1H-imidazo(4,5-b)pyridine, (R)-5-methoxy-2-[(4-methoxy-3,5-dimethyl-2-

pyridinyl)methylsulphanyl]-1H-benzimidazole, (R)-5-difluoromethoxy-2-[(3,4-dimethoxy-2-pyridinyl)methylsulphanyl]-1H-benzimidazole, (R)-2-[3-methyl-4-(2,2,2-trifluoroethoxy)-2-pyridinyl)methylsulphanyl]-1H-benzimidazole, (R)-2-{[4-(3-methoxypropoxy)-3-methylpyridin-2-yl)methylsulphanyl]-1H-benzimidazole [[or]] and (R)-5-methoxy-2-[(4-methoxy-3,5-dimethyl-2-pyridylmethyl)sulphanyl]-1H-imidazo[4,5-b]pyridine ~~is prepared by the process.~~

19-21. (Canceled)

22. (Currently amended) An optically pure PPI prepared by the process according to claim 1 selected from the group consisting of (S)-5-methoxy-2-[(4-methoxy-3,5-dimethyl-2-pyridinyl)methylsulphanyl]-1H-benzimidazole, (S)-5-difluoromethoxy-2-[(3,4-dimethoxy-2-pyridinyl)methylsulphanyl]-1H-benzimidazole, (S)-2-[3-methyl-4-(2,2,2-trifluoroethoxy)-2-pyridinyl)methylsulphanyl]-1H-benzimidazole, (S)-2-{[4-(3-methoxypropoxy)-3-methylpyridin-2-yl)methylsulphanyl]-1H-benzimidazole or (S)-5-methoxy-2-[(4-methoxy-3,5-dimethyl-2-pyridylmethyl)sulphanyl]-1H-imidazo[4,5-b]pyridine, (R)-5-methoxy-

2-[(4-methoxy-3,5-dimethyl-2-pyridinyl)methylsulphanyl]-1H-benzimidazole, (R)-5-difluoromethoxy-2-[(3,4-dimethoxy-2-pyridinyl)methylsulphanyl]-1H-benzimidazole, (R)-2-[3-methyl-4-(2,2,2-trifluoroethoxy)-2-pyridinyl)methylsulphanyl]-1H-benzimidazole, (R)-2-{[4-(3-methoxypropoxy)-3-methylpyridin-2-yl)methylsulphanyl]-1H-benzimidazole [[or]] and (R)-5-methoxy-2-[(4-methoxy-3,5-dimethyl-2-pyridylmethyl)sulphanyl]-1H-imidazo[4,5-b]pyridine ~~prepared by the process according to Claim 1.~~

23. (New) The process according to Claim 1, wherein the oxidation is carried out in the presence of a chiral auxiliary.

24. (New) The process according to Claim 23, wherein the chiral auxiliary is a chiral tartaric acid derivative.

25. (New) The process according to Claim 23, wherein the chiral auxiliary is selected from the group consisting of (+)-L-tartaric acid bis-(N,N-diallylamide), (+)-L-tartaric acid bis-(N,N-dibenzylamide), (+)-L-tartaric acid bis-(N,N-diisopropylamide), (+)-L-tartaric acid bis-(N,N-dimethylamide), (+)-L-tartaric acid bis-(N-

pyrrolidinamide), (+)-L-tartaric acid bis-(N-piperidinamide), (+)-L-tartaric acid bis-(N-morpholinamide), (+)-L-tartaric acid bis-(N-cycloheptylamide), (+)-L-tartaric acid bis-(N-4-methyl-N-piperazinamide), dibutyl (+)-L-tartrate, di-tert-butyl (+)-L-tartrate, diisopropyl (+)-L-tartrate, dimethyl (+)-L-tartrate, diethyl (+)-L-tartrate, (-)-D-tartaric acid bis-(N,N-diallylamide), (-)-D-tartaric acid bis-(N,N-dibenzylamide), (-)-D-tartaric acid bis-(N,N-diisopropylamide), (-)-D-tartaric acid bis-(N,N-dimethylamide), (-)-D-tartaric acid bis-(N-pyrrolidinamide, (-)-D-tartaric acid bis-(N-piperidinamide), (-)-D-tartaric acid bis-(N-morpholinamide), (-)-D-tartaric acid bis-(N-cycloheptylamide), (-)-D-tartaric acid bis-(N-4-methyl-N-piperazinamide), dibutyl (-)-D-tartrate, di-tert-butyl (-)-D-tartrate, diisopropyl (-)-D-tartrate, dimethyl (-)-D-tartrate and diethyl (-)-D-tartrate.

26. (New) The process according to Claim 23, wherein the chiral auxiliary is selected from the group consisting of (+)-L-tartaric acid bis-(N,N-dimethylamide), (+)-L-tartaric acid bis-(N-pyrrolidinamide), (+)-L-tartaric acid bis-(N-morpholinamide), (-)-D-tartaric acid bis-(N,N-

dimethylamide), (-)-D-tartaric acid bis-(N-pyrrolidinamide) or (-)-D-tartaric acid bis-(N-morpholinamide).

27. (New) The process according to Claim 23, wherein the chiral zirconium complex is selected from the group consisting of zirconium(IV) acetylacetonate, zirconium(IV) butoxide, zirconium(IV) tert-butoxide, zirconium(IV) ethoxide, zirconium(IV) n-propoxide, zirconium(IV) isopropoxide, and zirconium(IV) isopropoxide/isopropanol, and wherein the chiral auxiliary is selected from the group consisting of (+)-L-tartaric acid bis-(N,N-diallylamide), (+)-L-tartaric acid bis-(N,N-dibenzylamide), (+)-L-tartaric acid bis-(N,N-diisopropylamide), (+)-L-tartaric acid bis-(N,N-dimethylamide), (+)-L-tartaric acid bis-(N-pyrrolidinamide), (+)-L-tartaric acid bis-(N-piperidinamide), (+)-L-tartaric acid bis-(N-morpholinamide), (+)-L-tartaric acid bis-(N-cycloheptylamide), (+)-L-tartaric acid bis-(N-4-methyl-N-piperazinamide), dibutyl (+)-L-tartrate, di-tert-butyl (+)-L-tartrate, diisopropyl (+)-L-tartrate, dimethyl (+)-L-tartrate, diethyl (+)-L-tartrate, (-)-D-tartaric acid bis-(N,N-diallylamide), (-)-D-tartaric acid bis-(N,N-dibenzylamide), (-)-D-tartaric acid bis-(N,N-

diisopropylamide), (-)-D-tartaric acid bis-(N,N-dimethylamide), (-)-D-tartaric acid bis-(N-pyrrolidinamide), (-)-D-tartaric acid bis-(N-piperidinamide), (-)-D-tartaric acid bis-(N-morpholinamide), (-)-D-tartaric acid bis-(N-cycloheptylamide), (-)-D-tartaric acid bis-(N-4-methyl-N-piperazinamide), dibutyl (-)-D-tartrate, di-tert-butyl (-)-D-tartrate, diisopropyl (-)-D-tartrate, dimethyl (-)-D-tartrate and diethyl (-)-D-tartrate.

28. (New) The process according to Claim 23, wherein the chiral zirconium complex is selected from the group consisting of zirconium(IV) acetylacetonate, zirconium(IV) butoxide, zirconium(IV) tert-butoxide, zirconium(IV) ethoxide, zirconium(IV) n-propoxide, zirconium(IV) isopropoxide, or zirconium(IV) isopropoxide/isopropanol complex, wherein the chiral auxiliary is selected from the group consisting of (+)-L-tartaric acid bis-(N,N-diallylamide), (+)-L-tartaric acid bis-(N,N-dibenzylamide), (+)-L-tartaric acid bis-(N,N-diisopropylamide), (+)-L-tartaric acid bis-(N,N-dimethylamide), (+)-L-tartaric acid bis-(N-pyrrolidinamide), (+)-L-tartaric acid bis-(N-piperidinamide), (+)-L-tartaric acid bis-(N-

morpholinamide), (+)-L-tartaric acid bis-(N-cycloheptylamide), (+)-L-tartaric acid bis-(N-4-methyl-N-piperazinamide), dibutyl (+)-L-tartrate, di-tert-butyl (+)-L-tartrate, diisopropyl (+)-L-tartrate, dimethyl (+)-L-tartrate, diethyl (+)-L-tartrate, (-)-D-tartaric acid bis-(N,N-diallylamide), (-)-D-tartaric acid bis-(N,N-dibenzylamide), (-)-D-tartaric acid bis-(N,N-diisopropylamide), (-)-D-tartaric acid bis-(N,N-dimethylamide), (-)-D-tartaric acid bis-(N-pyrrolidinamide), (-)-D-tartaric acid bis-(N-piperidinamide), (-)-D-tartaric acid bis-(N-morpholinamide), (-)-D-tartaric acid bis-(N-cycloheptylamide), (-)-D-tartaric acid bis-(N-4-methyl-N-piperazinamide), dibutyl (-)-D-tartrate, di-tert-butyl (-)-D-tartrate, diisopropyl (-)-D-tartrate, dimethyl (-)-D-tartrate and diethyl (-)-D-tartrate, and wherein the oxidation is carried out in the presence of an organic base.

29. (New) The process according to Claim 23, wherein the chiral auxiliary is selected from the group consisting of (+)-L-tartaric acid bis-(N,N-dimethylamide), (+)-L-tartaric acid bis-(N-pyrrolidinamide), (+)-L-tartaric acid bis-(N-

morpholinamide, (-)-D-tartaric acid bis-(N,N-dimethylamide), (-)-D-tartaric acid bis-(N-pyrrolidinamide) and (-)-D-tartaric acid bis-(N-morpholinamide), and wherein the oxidation is carried out in the presence of an organic base.

30. (New) The process according to Claim 23, wherein the chiral auxiliary is selected from the group consisting of (-)-D-tartaric acid bis-(N,N-dimethylamide), (-)-D-tartaric acid bis-(N-pyrrolidinamide) and (-)-D-tartaric acid bis-(N-morpholinamide), and wherein the optically pure PPI prepared by the process is (+)-pantoprazole.

31. (New) The process according to Claim 23, wherein the chiral zirconium complex is selected from the group consisting of is zirconium(IV) n-propoxide, zirconium(IV) isopropoxide or zirconium(IV) isopropoxide/isopropanol complex, wherein the chiral auxiliary is selected from the group consisting of (+)-L-tartaric acid bis-(N,N-dimethylamide), (+)-L-tartaric acid bis-(N-pyrrolidinamide) and (+)-L-tartaric acid bis-(N-morpholinamide), wherein the oxidation is carried out using cumene hydroperoxide, and

wherein the optically pure PPI prepared by the process is (-)-pantoprazole.

32. (New) The process according to Claim 23, wherein the chiral zirconium complex is selected from the group consisting of zirconium(IV) n-propoxide, zirconium(IV) isopropoxide and zirconium(IV) isopropoxide/isopropanol complex, wherein the chiral auxiliary is selected from the group consisting of (+)-L-tartaric acid bis-(N,N-dimethylamide), (+)-L-tartaric acid bis-(N-pyrrolidinamide) or (+)-L-tartaric acid bis-(N-morpholinamide), wherein the oxidation is carried out using cumene hydroperoxide in the presence of a tertiary amine, and wherein the optically pure PPI prepared by the process is (-)-pantoprazole.